

A Framework to Understand Enablers and Inhibitors in a Learning Management System: Experiences from Fronter

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Abstract—Many universities have decided to use various learning Platforms in order to foster the learning capability for students and to improve the teaching processes for faculty staff. Based on qualitative case studies conducted at two Norwegian universities, this paper intends to delineate a general framework outlining the challenges, issues and opportunities in using a Learning Management System (LMS) and more specifically the Fronter platform.

Keywords— Collaborative platform, Fronter platform, learning enablers, learning inhibitors, learning functionalities, LMS

I. INTRODUCTION

Several research studies have been undertaken in order to analyze how Higher Education (HE) could introduce a certain level of innovative approach in the way teaching and learning processes are performed. Certain requirements and challenges need to be overcome to provide lecture anytime, anywhere and for improving the communication between faculty, staff and students. The use of information systems (IS) and social media such as wiki, blog, facebook, games and Skype is contributing to shape the way of how and where teaching and learning is taking place [1, 2]. Following

this trend, most universities and colleges have initiated development and adaptation of IS applications for educational purposes [3].

Most of the Norwegian institutions have been involved in the development and deployment of Learning Management Systems (LMS) such as Fronter, Blackboard, Moodle, and WebCT [4, 5]. Technologically, a LMS consists of a collection of eLearning tools available through a shared administrative interface [6]. The dominant LMS-system is the Norwegian-developed Fronter platform. Faculty staff have been strongly encouraged to digitize their instructional materials and to use the provided learning platform for interacting both with the administration and with the students [7]. However, the sudden increase of available online teaching and learning material on campus has raised other types of challenges and requirements [8, 9]. Examples of such issues include identification and implementation of appropriate LMS functionalities. These typical needed functions include storage, organization, dissemination, search, indexation and retrieval of the learning material in the most effective way. There are, however, few studies focusing on how such learning managing systems are used. Moreover, there is little knowledge about

factors that may influence the fostering or hampering of LMS adoption.

Based on qualitative data from two Norwegian universities, the paper intends to delineate a general framework outlining the challenges, issues and opportunities in using such LMS and more specifically the Fronter platform.

The second part of the paper outlines the concept of LMS and features of Fronter. The third part introduces the context of study and the adopted research methodology. Section four analyses the set of collected data and defines a general framework encompassing the socio-technical factors that facilitate or hamper the implementation and usage of such LMS. Finally, section five provides some concluding remarks.

II. LMS AND FRONTER

LMS have been adopted by several educational institutions in order to cope with stringent requirements for faster and more flexible education and higher pedagogical quality. Users of LMS are classified into four categories; learners, instructors, Staff and administrators [11]. The learners represent end users of LMS (e.g. students) since the system is developed to satisfy their need of anytime, anywhere participation and learning. The instructors are the teachers or tutors that facilitate an online learning environment by utilizing the system to inform, coach, supervise, and evaluate the student's contributions and assignments. Faculty Staff are the employees working at different department at different levels such as operational or management. They are using LMS to post some information related to the management of school such as for i.e. timetable, overall curriculum, meetings and so forth. Finally, the administrators of the system maintain and upgrade the system and provide support for the end users.

A LMS offers functionality to distribute information to students in terms of posting messages, schedules, curriculums, and readings. A LMS encompasses several asynchronous and synchronous

communication functions such as discussion boards, chats and video meetings [12].

Today, there are more than hundred LMS with a variety of functions and key features. A study reviewing most of them have been conducted [13], and a comparison of various systems is provided in order to facilitate the selection of a LMS by the administrators.

However, former research studies demonstrate that there is no obvious evidence that faculty and administration staff will use the provided tools in an effective way. In fact, research studies advocate rather a latent or several open hostility from some stakeholders to fully exploit the functionality of LMS or other instructional tools [14, 15]. Therefore, it is important to understand the requirements and challenges encountered by the academic staff while using such systems.

In Norway, the most used LMS is Fronter, an online learning platform. Fronter is an open learning platform used by more than 3000 learning institutions across Europe. Fronter is a virtual building platform that can be easily structured into practical rooms. A room can be a lecture, project, etc. Each room is equipped with the tools required to empower the collaboration and learning such as discussion forum, notes, calendars, and so forth. A room is only open to selected participants and their privileges depend on their role in the room. Fronter presents several features in enhancing collaboration and cooperation between different stakeholders ranging from students to top management.

Recently, Fronter has developed extra packages such as Elluminate (virtual classroom with electronic meeting facilities such as whiteboard, application sharing, video and recording), and plagiarism control that checks assignments posted in Fronter.

III. RESEARCH CONTEXT AND METHOD

In order to investigate usage of Fronter and its learning capabilities, we conducted a case study of two institutions in Norway; Buskerud College University (HiBu) and University of Agder (UiA). The interest and

the benefits of using e-learning systems were recognized quite early at both institutions. The Center for Supplementary Education and Further Studies (EVU) at UiA started to use Fronter in 2000. Firstly, the intention of using Fronter was to offer distance education for EVU students and not for campus students. There were, however, some leftover licenses at EVU, and a group of faculty members at UiA got the opportunity to use Fronter. At that time, faculty and IT department at UiA had close interaction with the system developers responsible for Fronter, and UiA members had great opportunities to influence the development of Fronter to get customized upgrades and new functionalities in a short amount of time.

A couple of years later, UiA needed to take a decision on which LMS the university should select, and since Fronter already was partly adopted, it became naturally to choose this LMS for future use. Thus there was no strategic process related to this decision. However, there were no suitable alternatives at that time; the marked offered some complex American LMS, but those did not fit with the education system in Norway. In addition to UiA, two of the largest educational institutions in Norway decided to implement Fronter as their main LMS. Being a part of a university network of Fronter users was regarded as beneficially since it gave opportunities to make influence on the development of functionalities in Fronter, and for participating in a forum with other universities to discuss common interests and challenges in using and maintaining the same LMS. Finally, Fronter is possible to integrate with other systems at a university. At UiA Fronter is integrated with the student administration system FS and the HR and financial modules in SAP.

HiBu has been using the LMS, Blackboard and others for several years. However, given that most of the academic institutions in Norway are using Fronter, the management of HiBu recently decided to phase out Blackboard to replace it with Fronter. Consequently, all campus students

started to use Fronter in fall 2010. HiBu is therefore in an earlier adoption phase of Fronter than UiA is.

Data collection comprised semi-structured interviews with both academic and administration staff based at UiA and HiBu. In addition, we reviewed secondary material consisting of organizational documents such as notes, reports, brochures, and website contents. Participative observations were performed through seminars, informal meetings and discussions with faculty, staffs and students. In additions, the researchers' own experiences with Fronter have contributed to the results.

The process of data collection and analysis proceeded iteratively in accordance to the interpretive research tradition [16]; themes emerged gradually for categorization, and then to be examined more deeply as relevant.

IV. RESEARCH FINDINGS

In this chapter, we present key findings from our study of Fronter usage at UiA and HiBu. Firstly, we elaborate on how the functionalities of Fronter *facilitate* the learning environment for students and improve the teaching processes for faculty staff at UiA and HiBu. Secondly, we present findings demonstrating drawbacks and weaknesses of the system, which may *hamper* the learning processes and adoption of the system. Based upon these findings, we finally develop a framework encompassing the socio-technical factors and issues that may facilitate or hamper the implementation and usage of this LMS.

The findings are categorized into three main themes, which focus on 1) how different functionalities in Fronter are utilized (table 1), 2) how the participants benefit and learn from this system (table 2), and 3) drawbacks and weaknesses of the system (table 3)

A. Functionalities in Fronter

Findings demonstrate that faculty members are mostly using Fronter as a supplement to their lectures (traditional classroom teaching), and that asynchronous functionalities were the mostly used tools

(see details in table 1). Only a few classes did use Fronter as a complete distance learning system with no direct contact among the participants. Some classes used full distance learning in periods of the course, combined with face-to-face gatherings. In these classes, the students frequently used discussion board to complete their assignments in Fronter.

Synchronous functionalities such as the Fronter chat, was seldom used. Despite that the chat function is available; students preferred other tools such as MSN, Skype, Facebook and Microsoft LiveMeeting to support synchronous communication with tutor or students. Fronter's functionalities for sharing documents and editing were either unknown or not a preferred tool to use. Instead, students used google docs, Huddle, and dropbox to share documents and to write up group assignments. Fronter's Elluminate was yet not adopted in the classes at UiA and HiBu. Currently, a group of faculty members at UiA is testing this tool. Elluminate would require advanced training of the staff; (e.g. mastering the moderator role to administrate the virtual environment with different locations, is quite demanding). In addition, deployment would require additional support and maintenance resources.

B. Benefits and Learning Capabilities

The Faculty staff involved in this investigation regards Fronter as beneficial for structuring the learning environment in terms of having all information in one place. In addition, the message functions and email-list increased the efficiency when instructors wanted to reach the student quickly to pass on important information. In addition, this centralization of material may stimulate learning, as stated below.

I think Fronter may contribute to learning. Students get the possibility to prepare before and after a lecture when the information is available. Of course this depends on the students – if they really work with the material. The interaction between the students and the instructor in Fronter is also important for learning (assistant professor UiA).

TABLE I
FRONTER USAGE - FUNCTIONALITIES

Functionalities and Activities	Examples of Usage
Sharing, distributing, storing information	Posting curriculum, lecture notes, documents, scientific articles, learning material, links
Posting messages	Posting messages to students participating in a room, sending emails to list of students taking a particular course, announcing special events
Discussion boards	Students use discussion boards as part of assignments in some courses
Chat	Usage is very seldom
Assignments	Students are posting compulsory assignments to get ongoing feedback, final evaluation, grading
Tests	Multiple choice questions, a few courses have used question bank
Learning paths	Enable flexible, sequential and individual learning. On pilot stage, will be used in JAVA programming course in 2011 - to provide module based learning – students need to pass one module with a test to go to the next.
Elluminate	On pilot stage, resource demanding training and support

Furthermore, use of discussion boards and learning path in Fronter, were regarded as functionalities that positively influenced the learning effects. Key benefits from Fronter usage and its learning capabilities are summarized and listed in table 2.

TABLE 2
BENEFITS AND LEARNING CAPABILITIES

Benefits	Learning Capabilities
Structuring the learning environment by having all information in one place	Proactive work: Students can better prepare themselves Fronter enables easy follow-up work Learning material always available – flexibility anytime, anywhere
Increasing efficiency by providing important messages Reaching students whenever necessary	
Discussion boards were useful to activate the students	Use of discussion board provides learning effects, the students needed to regularly condense learning material to contribute in discussions
Efficient reuse of learning material from one year to another	Reusing and improving learning material may influence the learning process for instructors – increase efficiency
Fronter was regarded as useful and efficient for evaluation and feedback on students' assignments	Assignments and tests in Fronter may enhance learning effects – regular testing was regarded as important for learning
Learning path is a functionality in Fronter beneficially for customized learning	The functionality has a potential for improving the learning processes in e.g. programming courses through sequentially learning, students learn at different speed, Fronter enables a flexible speed of learning

TABLE 3
DRAWBACKS AND WEAKNESSES

Drawbacks/weaknesses	Risks /consequences
Too short time for reusing learning material –course rooms are deleted after 2 years	Loosing historical accounts in courses, double work
Some inconvenience in using the system, e.g. too many keystrokes to get what you want	Time consuming Inefficient
Information overload – missing opportunities to divide folder of courses into folder of years	Time consuming Inefficient
Double storage – store everything on local PC in addition to Fronter	Time consuming Inefficient, redundancy
Difficult to get a complete overview of a study program and former courses students have passed and their built up competence	Lack of information
No linkages between courses – course rooms are information silos	Less dynamic knowledge development
Cumbersome to share knowledge across courses because of the access rights	Less dynamic knowledge development
Lack of integration; tools for chatting, video, recording etc. are not integrated in an elegant way – user interface in other LMS such as “Its learning” and “Moodle” is more elegant and interactive	If possible, faculty will choose alternative tools, however, there is a top-down decision from management that students, faculty and administration staff should use Fronter
Doubting that Fronter is good enough system for offering a complete e-learning system for teaching at a distance	It is a strategy for developing complete e-learning courses at both sites, might be a risk if Fronter does not fulfill quality criteria
Fronter does not support group work	Students choosing other tools to communicate and share information (Skype, facebook, google docs)

C. Drawbacks and Weaknesses

Findings demonstrated several drawbacks and weaknesses in Fronter. However, some of these issues mentioned here, are probably caused by limited competence related to the opportunities embedded in the system.

Table 3 summaries the key findings related to these issues and potential risks/consequences for work performance and the system.

There was a need for more training in advanced functionalities, however, few had time available to attend courses, and announced courses got limited registration among the staff. Findings demonstrate that Fronter was also used in combination with

other tools such as Wikis to provide better historical accounts of course material. In addition, the open source LMS Moodle was used in courses particularly focusing on open source software and related issues.

Moodle has special tools for groups. Students can make their own groups, virtual group rooms, submit assignments and so on. Fronter lacks tools supporting group work. I think Fronter has its limitations, and you get locked in to one system. I think it is better to combine applications and small modules that are easy to use for students, programs that can easily give students feedback. If you use open source software then you can change when you need something else, more a plug and play kind of thing (assistant professor, UiA).

The quotation illustrates that there might be alternatives to Fronter, and the overall impression is that there were quite many drawbacks highlighted during our investigation. Figure 1 summarizes our findings into a framework illustrating the socio-technical factors that facilitate or hamper usage of a LMS based on Fronter experiences at two universities.

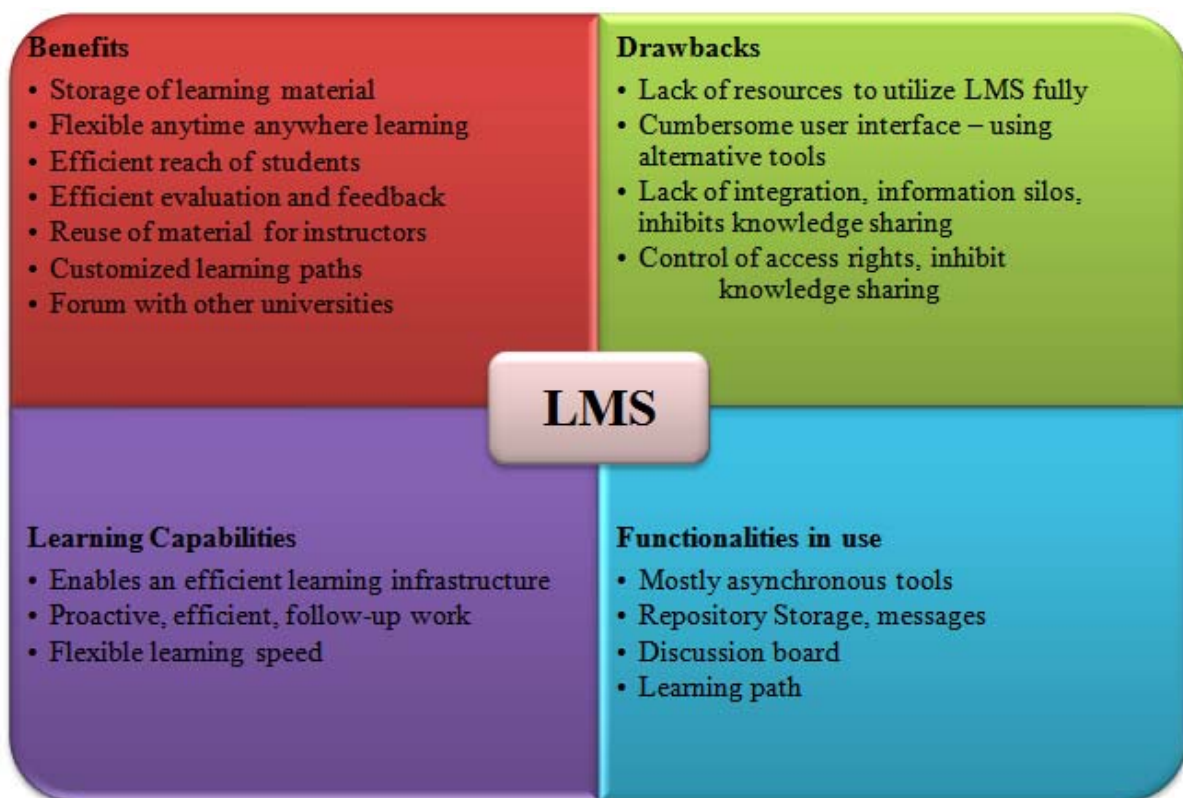


Fig. 1 A framework of socio-technical factors facilitating or hampering the implementation and usage of LMS

V. CONCLUSIONS

This paper has discussed the factors hampering or fostering the learning capability by investigating the deployment and the use of a learning management system Fronter that is used by both educational institutions participating to the evaluation. The findings were categorized into three main themes comprising 1) how different functionalities in Fronter are utilized, 2) how the participants benefit and learn from this system, and 3) drawbacks and weaknesses of the system. Based on these preliminary data, a framework consisting of the socio-technical factors facilitating or hampering usage of Fronter has been delineated. There is a general consensus that using a LMS will not as such enhance the learning capability but rather will provide infrastructural means and facilities to access more efficiently to the instructional material. Some social features such as chat room and discussion forum are seen as a good way to increase the collaboration and communication between stakeholders.

Our research was exploratory, which clearly has its limitations. Our conclusions are tentative, and therefore there is a need to further validate the presented concepts. In order to provide a more comprehensive overview, we are planning to send web surveys to the users of Fronter system. It would be interesting to see if our findings can be generalized across several educational institutions.

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